Electronic Version
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Claims

[c1] 1. A rotor in an electrical machine, the rotor comprising:
a magnetic core having at least two poles;
a plurality of winding assemblies, one for each pole; and
a cylindrical tube enclosing the magnetic core and winding assemblies, the tube including a plurality of rings having different axial widths.

[c2] 2. A rotor as in claim 1 wherein the tube is formed of a non-metallic material.

[c3] 3. A rotor as in claim 1 wherein each of the rings is axially spaced apart from an adjacent ring.

[c4] 4. A rotor as in claim 3 wherein the rings are axially spaced apart such that radial discharge slots defined in the magnetic core are axially aligned with respective spaces between the rings.

[c5] 5. A rotor as in claim 1 wherein the respective axial widths of the rings at both axial ends of the tube are smaller than the axial width of the ring axially located at or near the center of the tube.

[c6] 6. A rotor as in claim 1 wherein the respective axial

widths of the rings become progressively smaller than the axial width of the ring axially located at or near the center of the tube as the axial distance away from the center of the tube increases.

[c7] 7. A rotor as in claim 1 wherein the rotor further comprises a plurality of winding braces coupled to at least one of the winding assemblies, the winding braces having different radial heights.

[c8] 8. A rotor as in claim 7 wherein the radial heights of the winding braces located at both axial ends of the tube are smaller than the radial height of the winding brace axially located at or near the center of the tube.

[c9] 9. A rotor as in claim 7 wherein the respective radial heights of the winding braces become progressively smaller than the radial height of the winding brace axially located at or near the center of the tube as the axial distance away from the center of the tube increases.

[c10] 10. A rotor as in claim 1 wherein the rotor further comprises a plurality of winding braces coupled to at least one of the winding assemblies and axially spaced apart from each other, the axial distance between one pair of adjacent winding braces being different than the axial distance between another pair of adjacent winding

braces.

[c11] 11. A rotor as in claim 10 wherein the respective axial distances between the winding braces located at the ends of the tube are smaller than the axial distance between the winding braces located at or near the center of the tube.

[c12] 12. A rotor as in claim 10 wherein the respective axial distances between adjacent winding braces become progressively smaller than the axial distance between adjacent winding braces axially located at the center of the tube as the axial distance away from the center of the tube increases.

[c13] 13. A rotor as in claim 1 further comprising a shield having a plurality of ventilation holes defined therein, the shield being disposed between (i) the tube and (ii) the magnetic core and winding assemblies.

[c14] 14. A rotor as in claim 13 wherein the ventilation holes are circular.

[c15] 15. A rotor as in claim 13 wherein the ventilation holes are elliptical.

[c16] 16. A rotor as in claim 13 wherein the ventilation holes are aligned in respective rows in the axial direction of

the shield, and the respective rows of ventilation holes are axially aligned with respective axial spaces defined between the rings.

[c17] 17. A rotor as in claim 13 wherein the ventilation holes are aligned in respective rows in the axial direction of the shield and the axial distance between the rows is non-uniform.

[c18] 18. A rotor as in claim 17, wherein the distance between the rows of ventilation holes formed in the shield become progressively smaller as the axial distance away from the center of the shield increases.

[c19] 19. A cylindrical tube for enclosing rotor components including a magnetic core having at least two poles and a plurality of winding assemblies, the cylindrical tube comprising a plurality of rings having different axial widths.

[c20] 20. A cylindrical tube as in claim 19 wherein the tube is formed of a non-metallic material.

[c21] 21. A cylindrical tube as in claim 19 wherein each of the rings is axially spaced apart from an adjacent ring.

[c22] 22. A cylindrical tube as in claim 21 wherein the rings are axially spaced apart such that radial discharge slots

defined in the magnetic core are axially aligned with respective spaces between the rings.

[c23] 23. A cylindrical tube as in claim 19 wherein the respective axial widths of the rings at both axial ends of the tube are smaller than the axial width of the ring axially located at the center of the tube.

[c24] 24. A cylindrical tube as in claim 19 wherein the respective axial widths of the rings become progressively smaller than the axial width of the ring axially located at the center of the tube as the axial distance away from the center of the tube increases.